Claims

1. A system for classifying aerosol particles comprising:

a detector capable of generating a signal corresponding to a composite emission decay profile of an emission from an aerosol particle; and

means for deconvolving the signal into a discriminant vector that provides an indication of the nature of the aerosol particle.

2. A system for classifying aerosol particles comprising:

a detector capable of generating a signal corresponding to a composite emission decay profile of an emission from a sample of aerosol particles; and

a processor coupled to the detector to receive the signal,

wherein the processor can determine a scatter component and a fluorescence component of the composite emission decay profile.

3. The system of claim 2, wherein the fluorescence component comprises a biological component and a non-biological component.

4. The system of claim 3, wherein the processor can determine a scatter intensity value corresponding to the scatter component.

5. The system of claim 4, wherein the processor can determine a non-biological fluorescence value corresponding to the non-biological component.

6. The system of claim 5, wherein the processor can determine a biological fluorescence value corresponding to the biological component.

7. The system of claim 2, further comprising a radiation source disposed to discharge electromagnetic energy to stimulate the emission from the sample.

8. A method of classifying an aerosol particle comprising:

measuring a composite emission decay profile of an emission from the aerosol particle;

determining a biological fluorescence time constant of the composite emission decay profile; and

determining a biological emission constant of the composite emission decay profile.

9. The method of claim 8, further comprising stimulating the aerosol particle.

10. The method of claim 8, further comprising determining a scatter emission constant of the composite emission decay profile.

11. The method of claim 10, further comprising determining a non-biological fluorescence time constant of the composite emission decay profile.

12. The method of claim 11, further comprising determining a non-biological emission constant of the composite emission decay profile.

13. The method of claim 12, further comprising normalizing the scatter emission constant, the biological emission constant, and the non-biological emission constant relative to the scatter emission constant to produce a scatter component, a biological component, and a non-biological component.

14. The method of claim 13, further comprising mapping the scatter component relative to the biological component and the non-biological component to provide an indication of the nature of the aerosol particle.

15. The method of claim 12, further comprising determining a second biological fluorescence time constant of the composite emission decay profile.

16. The method of claim 15, further comprising determining a second biological emission constant of the composite emission decay profile.

17. The method of claim 12, further comprising determining a second non-biological time constant of the composite emission decay profile.

18. The method of claim 17, further comprising determining a second biological emission constant of the composite emission decay profile.

19. A method of classifying aerosol particles comprising:

stimulating the aerosol particles to promote radiation emission;

measuring a composite emission decay profile of the radiation emission, the composite emission decay profile comprising a scatter component, a first fluorescence component, and a second fluorescence component;

determining a scatter emission constant corresponding to the scatter component;

determining a first fluorescence emission constant of the composite emission decay profile; and

determining a second fluorescence emission constant of the composite emission decay profile.

20. The method of claim 19, further comprising deriving a first fluorescence time constant corresponding to the first fluorescence component.

21. The method of claim 20, further comprising deriving a second fluorescence time constant corresponding to the second fluorescence component.

22. The method of claim 19, further comprising determining a discriminant vector of the radiation emission as a function of the scatter emission constant, the first fluorescence emission constant, and the second fluorescence emission constant.

23. The method of claim 22, further comprising mapping the discriminant vector to provide an indication of the nature of the aerosol particle.

24. A method of classifying aerosol particles comprising:

measuring a composite emission from an aerosol particle;

deconvolving the composite emission to determine a discriminant vector of the aerosol particle; and

mapping the discriminant vector to provide an indication of the nature of the aerosol particle.

25. The method of claim 24, further comprising stimulating the aerosol particle to promote the composite emission.

26. The method of claim 24, wherein deconvolving the composite emission comprises determining a scatter emission constant and at least one of a biological emission constant and a non-biological emission constant.